CLAIMS

1.   An apparatus for rehabilitation, comprising:

an object adapted to be hand-held by a person and manipulated using the fingers to perform a task; and

a fine motion mechanism coupled to said object and adapted to apply sufficient force to move the object.

2.   An apparatus according to claim 1, wherein said apparatus weighs less than 30 kg.

3.   An apparatus according to claim 1 or claim 2, wherein said object is adapted to be translated along a surface.

4.   An apparatus according to claims 1-3, wherein said mechanism has a range of motion of less than 20 cm.

5.   An apparatus according to any of claims 1-4, and comprising a controller that analyzes motion of the object to determine at least one characteristic of the person.

6.   An apparatus according to any of claims 1-5 wherein the controller analyzes force applied to the object to determine at least one characteristic of the person.

7.   An apparatus according to claim 5 or claim 6 wherein the characteristic comprises an emotional state of the person.

8.   An apparatus according to any of claims 5-7 wherein said controller has stored therein patterns of motions.

9.   An apparatus according to claim 8, wherein said patterns include writing patterns.

10.   An apparatus according to any of claims 1-9, wherein said fine motion mechanism resists motion of said object by the person.

11.   An apparatus according to any of claims 1-10, wherein said fine motion mechanism applies resistance to motion of said object.

12.   An apparatus according to any of claims 1-11, wherein said fine motion mechanism assists with the movement of said object.

13.   An apparatus according to any of claims 1-12, wherein said object is equipped with at least one feedback source which imparts a stimulus to a user of the apparatus.

14.   An apparatus according to any of claims 1-13, further at least one sensor to track motion of said object.

15.   An apparatus according to any of claims 1-14, further comprising at least one sensor to track force applied to said object.

16.   An apparatus according to any of claims 1-15, wherein mechanism damps motion of said object.

17.   An apparatus according to any of claims 1-16, comprising a gross motion mechanism adapted to move said fine motion mechanism, in at least 2 degrees of freedom.

18.   An apparatus according to claim 17, wherein said gross motion mechanism is adapted to move said object from a table to a mouth of a patient.

19.   An apparatus according to claim 18, wherein said object comprises a chopstick.

20.   An apparatus according to any of claims 1-19, comprising a separate gross motion mechanism adapted to be attached to a person having said fingers and whose movement is coordinated with movement of said object.

21.   An apparatus according to any of claims 1-20, comprising a surface for said object to touch and which surface also functions as a display.

22.   An apparatus according to claim 21, wherein said surface comprises a tablet computer.

23.   An apparatus for rehabilitating motor control functions related to writing, comprising:

a surface;

a stylus extending upwards from the surface; and

a motion mechanism located under the surface that is adapted to change the orientation of the pen relative to the surface.

24.   An apparatus according to claim 23, wherein said motion mechanism is adapted to move said stylus on said surface.

25.   An apparatus according to claim 23, wherein said motion mechanism is adapted to be moved by a person holding the stylus.

26.   An apparatus according to any of claims 23-25, wherein said apparatus is adapted to measure a force applied to said stylus.

27.   An apparatus according to any of claims 23-26, wherein said apparatus comprises a controller having at least one pattern of motion stored therein.

28.   An apparatus according to claim 27, wherein said controller controls said motion mechanism responsive to said pattern.

29.   An apparatus according to claim 27, wherein said controller measures a mental state of a patient responsive to motion of said motion mechanism.

30.   A method of fine motor control rehabilitation, comprising:

providing an object to be manipulated by fingers of a patient; and

controlling an actuator coupled to the object to provide assistance to movement of the object, said actuator providing a range of motion to the object limited to less than 30 cm and having at least 3 degrees of freedom of motion.

31.   A method according to claim 30, wherein said assisted motion comprises writing.

32.   A method according to claim 30, wherein said assisted motion comprises eating.

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33.   A method of assisting a person in a daily task that involves controlling arm and finger motion comprising:

determining at least one characteristic of the task; and

using a robotic actuator to assist arm and/or finger motion.

34.   A method according to claim 33, comprising assisting only if said act fails to complete.

35.   A method according to claim 33, comprising assisting as a safety measure.

36.   A method according to claim 33, comprising assisting periodically as part of a rehabilitation process.